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REVIEWS

The Earth a Failing Structure. Presidential Address before the Philosophical Society of Washington. By JOHN F. HAYFORD. *Bulletin of the Philosophical Society of Washington, D. C.*, Vol. XV, pp. 57-74, December, 1907.

The title of the address clearly expresses its central thought. The endeavor is to show that the earth is not a competent elastic structure. The main basis of argument is that, in the past, the earth has yielded frequently, if not continuously, to the stress-differences brought to bear upon it, and that it is still yielding. This yielding is repeatedly spoken of as non-elastic, but specific evidence is not given that the yielding is strictly of the non-elastic type. Every geologist will accept the fact of yielding without hesitation, but some of us might be disposed to question the precise method by which the yielding takes place, for it is just at this point that discrimination now halts for adequate evidence, and it is just here that some of the greatest advances in deformation appear now to be on the verge of realization. If the conclusion that the earth is a failing structure can be safely based on the gross observation that it, or parts of it, have yielded to stresses in the past, there can be little ground for difference of view, and little occasion to regard the view as new except in its form of expression, and we may all acquiesce in the striking text of the address.

At the same time it may be said with equal deference to observed fact that the earth is a *creative* structure and that it long has been and still is *generating* structural strength, elasticity, and rigidity. On the whole, its creative activities seem to have been quite as pronounced as its failing tendencies; its acquisitions of competency to have been quite as great as its exhibitions of incompetency.

Perhaps nothing better represents a failing structure, in the sense of the address, than a glacier which, under normal conditions, is ever yielding to the stress of gravity. And yet if one wanted to select a cubic foot of ice which had the maximum of strength and rigidity and the highest elastic limit, he would seek it at the lower end rather than the upper end of the glacier. The structural competency of the ice normally increases in about the proportion in which it has previously failed as a competent elastic structure, if one so interprets its yielding.

If a sandstone be sufficiently stressed, it will perhaps seem to fail as a structure, but the quartzite into which it might pass would doubtless